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FIRELESS LOCOMOTIVES FOR TRAMWAYS.

BY G. LENTZ, DIRECTOR OF THE LOCOMOTIVE WORKS, HOHENZOLLERN.

The fireless locomotive, of which we give an outside elevation, is one of a type of which a considerable number are being built by the Locomotiv Fabrik Hohenzollern, for Java. They are constructed with inside frames and inside cylinders; the wheels are four in number and are coupled. The reversing gear is of the Joy type. The steam or hot-water reservoir rests on two cross-stays connecting the longitudinal frames of the engine; it is a plain cylinder with bulged ends and a dome. Steam is taken from the dome of the reservoir through a perforated copper pipe leading into a reducing valve, where the pressure is reduced to 100 pounds per square inch, and the steam is then conveyed through a pipe of large diameter which passes through the water space of the reservoir and through the bottom, where it divides, a branch leading to each valve box. A steam trap is formed at the termination of the large steam pipe, a smaller pipe leading some distance up into it, and very dry steam is thus obtained for the cylinders. This arrangement offers, no doubt, considerable advantage over the steam supply of ordinary small locomotives, where frequently a large percentage of water is carried over into the cylinders, particularly when the boilers are worked hard.

The steam reservoir of this tram engine is carefully protected, by means of sheet iron, layers of felt, and air space, from loss of heat by radiation, and it has been found by experience that the loss in pressure amounts to from 3¼ pounds per hour in summer to 7 pounds per hour in winter.

The arrangement for admitting high pressure steam into this boiler consists of a valve, fitted with a coupling for connecting a flexible hose, and fixed to the back end of the boiler, and a steam feed pipe enters the boiler and extends down to the bottom, where it enters a perforated pipe placed along the bottom of the boiler. When steam is admitted a considerable ebullition takes place, all the water is evenly heated through, dead water cannot lodge anywhere, and the boiler is, therefore, not liable to much wear and tear, and will last many years, while the small tubular boilers of locomotives are difficult to clean and repair, often badly fired, and maintained, and while only lasting from five to eight years, cause heavy expenditures for repairs even during this time.

It is evident that, with a properly constructed plant of stationary boilers of first-class workmanship—none other would be advisable for such high pressure, and an injudicious attempt to save in this plant might lead to serious difficulties —steam can be produced in the most economical manner; hot feed, large grates, cheap fuel, and a reduced staff of attendants, all help to materially reduce the cost of steam. Returning now to the fireless tramway engines, we find that one engine driver is sufficient for each locomotive. Boiler repairs being all but avoided, a smaller number of standby locomotives are required, reducing not only the capital involved, but also cost for repairs, and requiring smaller repairing shops.

Great benefits result to the traveling public from the absence of fire in these locomotives; there are no flying sparks, ashes, cinders, and unpleasant products of combustion; the engine and carriages remain longer clean, and costs for cleaning and repairs alike are reduced. There is also a saving in labor and fuel due to the circumstance that the engines do not require to be lighted up in the morning; they are charged before being brought into the sheds at night, and although they lose from 30 pounds to 60 pounds pressure during night, they are ready for work at any moment's notice.

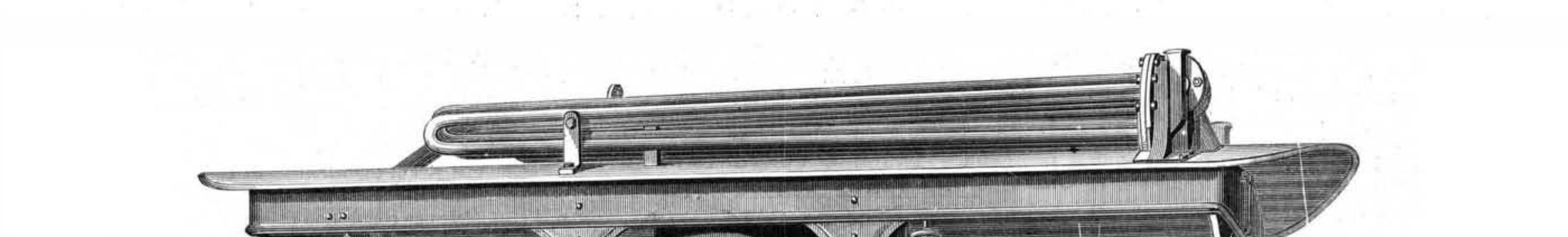
The hot water reservoirs of engines weighing 9½ tons have been made to contain 462 gallons of water, which has been found amply sufficient. To construct an ordinary locomotive for the same work would require some 73 horse power, which could not well be obtained in less than 13 tons weight, and this would necessitate heavier permanent way, and would require an extra amount of fuel and water to carry the additional dead weight.

A very important advantage in favor of fireless locomotives is the fact that the power stored in the hot water reservoir may be used as conditions require, and a uniform speed can be kept up on rising gradients as well as on level, a result not obtainable with ordinary locomotives.

Where the exhaust is used as chimney blast a slow speed causes, moreover, a slower combustion, and it is not a rare occurrence that locomotives come to a dead stop on steep gradients, an accident that cannot happen with fireless locomotives, since they always possess a very large store of power.

An excellent field for the application of fireless engines is open in small river steamers which have only to run short distances. In place of a boiler, these steamers carry a water reservoir, and they are charged with steam at the landing pier through well protected piping. On small steamers, boilers are frequently worked at great disadvantage, they are indifferently attended to, difficult to clean, and frequently worked when in a dangerous condition. It will, moreover, be acknowledged that small marine boilers are difficult to manage, they have but little water space, steam rises and water falls rapidly, and it can only be surprising that explosions do not happen more frequently.

For these reasons stated above the fireless arrangement appears admirably suited for small steamers. In laying out the stationary boiler plant for supplying the necessary steam, economically constructed boilers with large water contents, steam room, and large steam surface should be provided, evaporating about 3·5 pounds of water per square foot of heating surface per hour. In calculating the dimensions of the stationary plant required in connection with these locomotives, it may be assumed that about one-ninth of the contents of the reservoirs has to be resupplied at each charge;



FIRELESS TRAMWAY LOCOMOTIVE FOR JAVA.—CONSTRUCTED AT THE HOHENZOLLERN LOCOMOTIVE WORKS, DUSSELDORF.

if, therefore, the engine we calculated of 9½ tons total weight carries 4,540 pounds of water it would require 550 pounds of steam at the commencement of each journey. According to the facilities provided for charging the reservoirs the time required between the arrival of a locomotive and the departure of its train varies between twenty and thirty minutes; if, therefore, a train is to start every five minutes from four to six engines will always be in the boiler house for charging. Adding to a journey of forty-five minutes, twenty-five minutes for charging, we have seventy minutes as the total time employed, and if trains are to run every five minutes, fourteen locomotives will be required, of which nine are running while five are being charged. Since these engines would probably be worked five days out of six, only three more engines would be required, and a reserve of three more would complete a plant of twenty locomotives for a constant service. If this service is carried on with the locomotives we have been several times referring to, of 9½ tons weight, we should require three boilers of 720 square feet of heating surface, each to supply twelve engines every hour. The stationary plant should, however, of course, have one standing boiler, and consist of four boilers of this size.

This system of fireless engines was first introduced by Dr. Lamm, of New Orleans, in 1872, and the first engines were started on this principle in 1874. Dr. Lamm, however, died soon afterward. M. Lion Francq, of Paris, built an engine on this principle in 1874–75, in which he introduced numerous improvements, and in the following year a series of careful trials were made with these engines. At present M. Lion Francq is manager of the Compagnie Continentale d'Exploitation des Locomotives sans Foyer in Paris, and this company is working the system of fireless locomotives.

The Hohenzollern Locomotive Works, at Düsseldorf, are at present building a large number of fireless locomotives and plant for Java, and an interesting series of comparative trials is now being carried out on an experimental line near to these works between fireless and ordinary locomotives.

The fireless locomotives are being fed from one of the stationary boilers built for Java, and run the whole distance for which they are afterwards intended, drawing behind them the proper train weight. These trials afford an excellent opportunity for all interested in light and cheap steam tramway traffic to compare the fireless with the old system.—*Engineering.*

Aconite in Dysentery.

Dr. Owen reports the results of one hundred and fifty-one cases of *acute dysentery treated with aconite.* He was induced to look about for another treatment than the conventional one with ipecac, on account of the nausea which often attends the latter, and which often drives hospital patients, especially, to rebel against a repetition of the dose. Dr. Owen gave the tincture of the British pharmacopœia, which is of one-sixth the strength of Fleming's tincture. He gave one minim every fifteen minutes for the first two hours; after that, one minim every hour. This would make thirty minims in twenty-four hours. Dr. Owen feels that his experience in one hundred and fifty-one cases justifies him in speaking quite positively in favor of the treatment. In his paper he gives a very good analysis of his results.—*N. Y. Med. Journ.*

Quick Work at an English Colliery.

A note was made recently of an example of rapid raising of coal at an American colliery. The following, which is regarded in England as a remarkable instance of expeditious work, will serve for comparison: Pit No. 3, Newlands, near Baillieston, Braehead Collieries, is 120 fathoms deep. The engines are coupled horizontal, 18 inch cylinders, 4 feet 6 inch stroke, and the quantity of tubs drawn from the shaft for one shift was 1,865. The cages are double, holding two tubs abreast. For one hour's winding during the day there were drawn 240 tubs, giving an average for drawing, changing, etc., of 30 seconds for each "tow." The above quantity is coal only, so that including rubbish, etc., drawn during the shift, there were considerably over 1,900 tubs brought to the bank. The average output is about 1,600 tubs per day.

Waterproof Paper.

According to the *Journ. Soc. of Arts*, a strong, impervious parchment-paper is obtained by thoroughly washing woolen or cotton fabrics, so as to remove gum, starch, and other foreign bodies, then to immerse them in a bath containing a small quantity of paper pulp. The latter is made to penetrate the fabric by being passed between rollers. Thus prepared, it is afterwards dipped into sulphuric acid of suitable concentration, and then repeatedly washed in a bath of aqueous ammonia until every trace of acid has been removed. Finally, it is pressed between rollers to remove the excess of liquid, dried between two other rollers which are covered with felt, and lastly calendered.

Washington Monument.

Washington monument now exceeds 300 feet in height, and is rising at the rate of about a foot a day. The workmen are protected by a strong netting which surrounds the top of the monument. Already the net has saved the life of one workman, who was blown from his place by a gust of wind.

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(Illustrated articles are marked with an asterisk.)

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No. 354,

For the Week ending October 14, 1882.

Price 10 cents For sale by all newsdealers.

THE JEANNETTE EXPEDITION.—LIEUTENANT DANENHOWER'S LECTURE.

Lieutenant J. W. Danenhower, of the unfortunate exploring expedition in the Jeannette, has prepared a course of lectures on the experiences and results of the expedition, illustrated by large and carefully prepared charts of the regions traversed. His first lecture, delivered in the Brooklyn Academy of Music, October 3, was quite successful.

The dangers of the expedition began when Wrangell Land was sighted, September 6, 1879, and the Jeannette entered the ice fields. The sun disappeared September 9, and soon after the vessel was caught in the ice field, which did not relax its grasp until the following June, and then only to allow the vessel to sink. The Arctic night was very dark between the hours of eight and ten of our mornings, but at other times was clear except during storms. The auroras were not so bright as the lecturer had seen at home. Among the displays were auroral curtains and arches.

The absence of icebergs in the part of the Arctic Sea traversed by the Jeannette was specially noticeable. The ice which covered the sea in all directions was true polar ice, the frozen salt water of the sea, which grows from eight to ten feet in thickness in a single winter, and when broken up by the winds and currents becomes tumbled and heaped as "pack ice." The chief amusement during the winter was hunting seals and bears. The bears of that region were not at all formidable, the largest killed weighing about 1,100 pounds. During the first year the crew had bear's meat twice a week, but preferred pork and beans. The diet of civilized life, as afforded by canned meats and vegetables, was not only more acceptable to all, but more wholesome than bear's meat and seal's blubber. The only trouble with the canned provisions was the bad material of the cans. The tin contained lead, and several of the men were poisoned by the tin dissolved by the food stuff in the cans. The summer season proved less comfortable than winter, owing to chilling fogs and the general dampness of the ship.

The sinking of the Jeannette was vividly described. The retreat of boats to the Siberian shore began on the anniversary of the Battle of Bunker Hill, June 17. After Bennett Island was sighted the party were fifteen days going twenty-five miles to reach it. The retreating party was scattered by the separation of the boats in the gale and increasing darkness of September 12. Of the delta of the Lena, Lieutenant Danenhower said that instead of nine mouths, as laid down on the charts, there were really 190 rivers flowing north and cutting up the region into sand banks and mud flats.

ACCIDENT WITH ELECTRIC LIGHT WIRES.

The first fatal accident with electric light wires in this city occurred October 4, the victim being an experienced line man in the employ of the Brush Electric Light Company. He was engaged in splicing a "live" wire to increase its length so that it could be transferred to another and higher pole. To do this without interrupting the current the splice had to be inserted as a loop around the point to be cut; and in making the loop connections the insulating material of the wire had to be scraped away to secure contact of the naked wires. The rule of such work is to complete one connection before beginning the other, and to complete both connections before cutting the wire, exercising meantime the utmost care to avoid touching the wires so as to allow any portion of the body to be brought into the circuit of the electric current or any part of it. By some slip or other unexplained mishap, the line man failed to properly observe these precautions, and the failure cost him his life. He was caught by the wires in such a way that he did not fall to the ground, though he was unconscious from the moment he received the shock. The fact that he did not die instantly is thought to prove only part of the current passed through his body. The palms of both hands were burned. The wire from which the fatal shock was received was carrying electricity for forty lights of 2,000 candle power each.

FIREPROOF UPPER WORKS FOR STEAMERS.

The need of incombustible upper works for river steamers is once more made emphatic by the burning of a magnificent passenger boat with heavy loss of life. Early in the morning of September 30, the Robert E. Lee, one of the finest and fastest of the large steamers plying on the Mississippi River, was destroyed by fire about twenty-five miles below Vicksburg, Miss. The origin of the fire is not known. It was first observed by the engineer, who instantly warned the pilot. The boat was headed for the shore, against which she was driven with such force as to be firmly fastened. All in the forward part of the vessel quickly escaped; of those aft of the fire twenty or more were lost; the rest were picked up by passing boats. Great credit is given to the pilot, John Stout, who, though surrounded by fire, remained at the wheel, and to the engineer, William S. Perkins, who stood at his post until the pilot announced that the boat was ashore. So rapid was the fire that it was impossible for the passengers or officers to save anything but the clothes they had on. Clerk Bell, who gave the warning, was followed by the fire so rapidly that he escaped with great difficulty. The vessel burned, he said, "like gunpowder."

The R. E. Lee was a side wheeler, of 1,479 tons burden; length, 315 feet; beam, 48 feet; with storage capacity for 9,000 bales of cotton. She had 9 steel boilers, each 32 feet long and 42 inches in diameter, 40 inch cylinder, and 10 feet